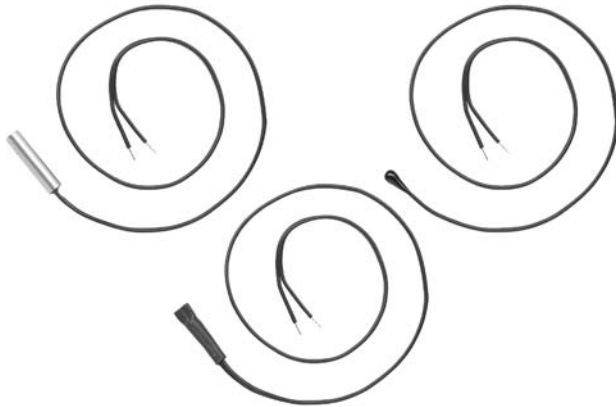


## NTC Thermistors, Special Long Lead Sensors



### FEATURES

- Accurate over wide temperature range
- High stability
- Excellent price/performance ratio
- High adhesive strength between PVC wire and the encapsulating laquer

### APPLICATIONS

Temperature sensing and control

These thermistors have a negative temperature coefficient.

The epoxy-coated type (2322 641 2....) consists of a chip with UL wire and is lacquered and insulated with black epoxy.

The sleeved type (2322 641 3....) and the brass-pipe type (2322 641 4....) are suitable for application in various environmental conditions.

### MARKING

UL mark on wire, no mark on body.

### PACKAGING

The thermistors are packed in cardboard boxes; each box containing 500 pcs.

QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C ( $R_{25}$ )	2.2 to 100	k $\Omega$
Tolerance on $R_{25}$ -value	$\pm 3$	%
Tolerance on $B_{25/85}$ -value	$\pm 1.5$ or $\pm 0.75$	%
Maximum dissipation	250	mW
Dissipation factor:		
2322 641 2....	6.0	mW/K
2322 641 3....	8.0	mW/K
2322 641 4....	6.0	mW/K
Response time; note 1:		
2322 641 2....	$\approx 7$	s
2322 641 3....	$\approx 15$	s
2322 641 4....	$\approx 10$	s
Operating temperature range:		
at zero dissipation	-40 to +85	°C
at maximum dissipation	0 to +50	°C
Climatic category	40/085/56	
Lead wire; note 2	UL-2468.AWG24 wire	
Mass:		
2322 641 2....	$\approx 4$	g
2322 641 3....	$\approx 6$	g
2322 641 4....	$\approx 6$	g

#### Notes

1. Response time in silicone oil MS 200/50. This is the time needed for the sensor to reach 63.2% of the total temperature difference when subjected to a temperature change from 25 °C in air to 85 °C in oil.
2. Wire length and wire type are optional on request. The products can be provided with a connector on request.
3. Tighter tolerances on  $R_{25}$  are available upon request.

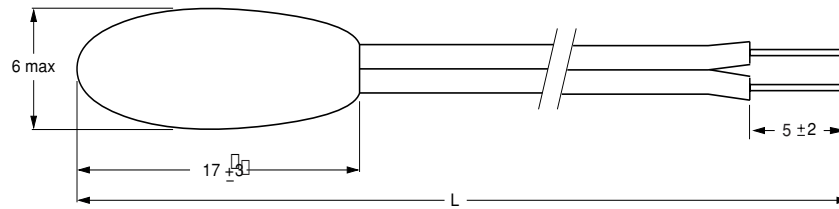
ELECTRICAL DATA AND ORDERING INFORMATION				
$R_{25}$ (k $\Omega$ )	$B_{25/85}$ -VALUE	CATALOG NUMBER 2322 641 ..... <sup>(2)</sup>		
		EPOXY-COATED TYPE	SLEEVED TYPE	BRASS-PIPE TYPE
2.2	3977 K $\pm 0.75\%$	26222	36222	46222
5	3977 K $\pm 0.75\%$	26502	36502	-
10	3977 K $\pm 0.75\%$	26103	36103	46103
47	4090 K $\pm 1.5\%$	26473	36473	-
100	4190 K $\pm 1.5\%$	26104	36104	46104

#### Notes

1. Other values based on the 2322 640 0.... series are available on request.
2. The specified catalog numbers refer to products with L = 400 mm, without connector and adopt UL-2468.AWG24 wire.

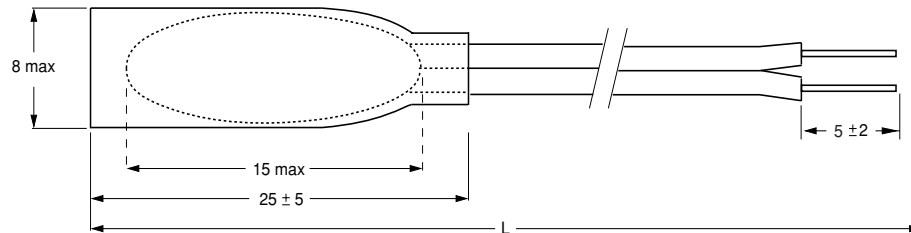
**DIMENSIONS** in millimeters

Epoxy-coated type 2322 641 2....



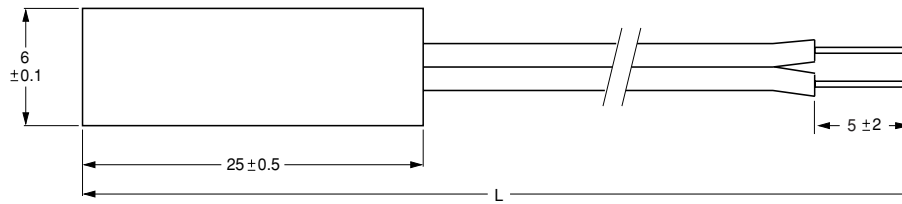
L = 400 mm +15/-0. Other wire lengths available on request.

Sleeved type 2322 641 3....



L = 400 mm +15/-0. Other wire lengths available on request.

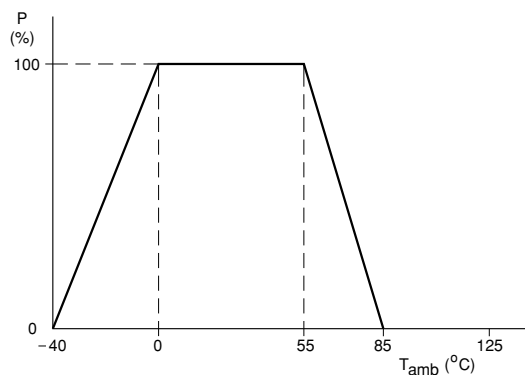
Brass-pipe type 2322 641 4....



L = 400 mm +15/-0. Other wire lengths available on request.

**DERATING**

Power derating curve.





**R-T CHARACTERISTICS**

<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES</b>							
$T_{amb}$ (°C)	$R_T/R_{25}$	$\Delta R$ DUE TO B-TOLERANCE (%)	TC (%/K)	$R_{25}$ (kΩ)			
				2322 641 2/3/4 .....; see note 1 at end of tables			
				.6222	.6502	.6103	
-40	33.21	2.66	6.57	73.06	166.1	332.1	
-35	23.99	2.41	6.36	52.78	120.0	240.0	
-30	17.52	2.17	6.15	38.55	87.60	175.2	
-25	12.93	1.94	5.95	28.44	64.65	129.3	
-20	9.636	1.71	5.76	21.20	48.18	96.36	
-15	7.250	1.50	5.58	15.95	36.25	72.50	
-10	5.505	1.29	5.40	12.11	27.52	55.05	
-5	4.216	1.08	5.24	9.275	21.08	42.16	
0	3.255	0.89	5.08	7.162	16.28	32.56	
5	2.534	0.70	4.92	5.575	12.67	25.34	
10	1.987	0.52	4.78	4.372	9.936	19.87	
15	1.570	0.34	4.64	3.454	7.849	15.70	
20	1.249	0.17	4.50	2.747	6.244	12.49	
25	1.000	0.00	4.37	2.200	5.000	10.00	
30	0.8059	0.16	4.25	1.773	4.030	8.059	
35	0.6535	0.32	4.13	1.438	3.267	6.535	
40	0.5330	0.47	4.02	1.173	2.665	5.330	
45	0.4372	0.62	3.91	0.9618	2.186	4.372	
50	0.3605	0.77	3.80	0.7932	1.803	3.606	
55	0.2989	0.91	3.70	0.6575	1.494	2.989	
60	0.2490	1.05	3.60	0.5478	1.245	2.490	
65	0.2084	1.18	3.51	0.4586	1.042	2.084	
70	0.1753	1.31	3.42	0.3857	0.8765	1.753	
75	0.1481	1.44	3.33	0.3258	0.7405	1.481	
80	0.1256	1.57	3.25	0.2764	0.6282	1.256	
85	0.1070	1.69	3.16	0.2355	0.5352	1.070	

<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES</b>					
$T_{amb}$ (°C)	$R_T/R_{25}$	$\Delta R$ DUE TO B-TOLERANCE (%)	TC (%/K)	$R_{25}$ (kΩ)	
				2322 641 2/3/4 .....; see note 1 at end of tables	
				.6473	
-40	33.81	5.55	6.55	1589	
-35	24.50	5.02	6.34	1151	
-30	17.93	4.52	6.15	842.8	
-25	13.25	4.03	5.96	622.6	
-20	9.875	3.56	5.78	464.1	
-15	7.425	3.10	5.61	349.0	
-10	5.630	2.67	5.45	264.6	
-5	4.304	2.24	5.29	202.3	
0	3.315	1.84	5.14	155.8	
5	2.573	1.44	4.99	120.9	
10	2.011	1.07	4.85	94.53	
15	1.583	0.70	4.72	74.40	
20	1.254	0.34	4.59	58.95	
25	1.000	0.00	4.46	47.00	
30	0.8024	0.33	4.34	37.71	
35	0.6474	0.66	4.23	30.43	
40	0.5255	0.98	4.12	24.70	
45	0.4288	1.28	4.01	20.15	
50	0.3518	1.59	3.91	16.53	
55	0.2901	1.88	3.81	13.63	



$T_{amb}$ (°C)	$R_T/R_{25}$	$\Delta R$ DUE TO B-TOLERANCE (%)	TC (%/K)	$R_{25}$ (k $\Omega$ )
				2322 641 2/3/4 ....; see note 1 at end of tables
				<b>.6473</b>
60	0.2403	2.17	3.71	11.30
65	0.2001	2.45	3.62	9.404
70	0.1674	2.72	3.53	7.865
75	0.1406	2.99	3.44	6.607
80	0.1186	3.25	3.36	5.573
85	0.1004	3.51	3.28	4.721

### RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

$T_{amb}$ (°C)	$R_T/R_{25}$	$\Delta R$ DUE TO B-TOLERANCE (%)	TC (%/K)	$R_{25}$ (k $\Omega$ )
				2322 641 2/3/4 ....; see note 1
				<b>.6104</b>
-40	36.66	5.69	6.70	3666
-35	26.38	5.15	6.49	2638
-30	19.17	4.63	6.29	1917
-25	14.06	4.13	6.10	1406
-20	10.41	3.65	5.92	1041
-15	7.779	3.18	5.74	777.9
-10	5.861	2.73	5.57	586.1
-5	4.453	2.30	5.41	445.3
0	3.409	1.88	5.26	340.9
5	2.631	1.48	5.11	263.1
10	2.044	1.09	4.97	204.4
15	1.600	0.72	4.83	160.0
20	1.261	0.35	4.70	126.1
25	1.000	0.00	4.57	100.0
30	0.7981	0.34	4.45	79.81
35	0.6408	0.67	4.35	64.08
40	0.5175	1.00	4.22	51.74
45	0.4202	1.32	4.11	42.02
50	0.3431	1.63	4.00	34.31
55	0.2816	1.93	3.90	28.16
60	0.2322	2.22	3.80	23.22
65	0.1925	2.51	3.71	19.25
70	0.1602	2.79	3.62	16.03
75	0.1340	3.06	3.53	13.40
80	0.1126	3.33	3.45	11.26
85	0.09496	3.59	3.36	9.496

#### Note

- Replace dot in last 5 digits of catalog number by a number according to the following details:
  - 2 for epoxy-coated type
  - 3 for water-resistant type
  - 4 for brass-pipe type.

### TESTS AND REQUIREMENTS

STABILITY TESTS				
IEC	CECC	TEST	PROCEDURE	DRIFT REQUIREMENT
	D3; 4.20.1	endurance	85 °C; 1000 hours	$\Delta R/R < 5\%$
<b>68-2-1</b>		endurance	-40 °C; 1000 hours	$\Delta R/R < 5\%$
<b>539</b>		endurance	250 mW; 55 °C; 1000 hours	$\Delta R/R < 5\%$
<b>68-2-3</b>	D1; 4.19	damp heat, steady state	56 days at 40 °C; 90 to 95% RH	$\Delta R/R < 7\%$
<b>68-2-14</b>	C2; 4.14	rapid change of temperature	-40 to +85 °C; 50 cycles	$\Delta R/R < 5\%$